

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claims 1-35. (Cancelled)

36. (New) A method of measuring feature parameters on a wafer in a microelectronic fabrication process, comprising the steps of:

taking a first optical metrology measurement at a feature location on a wafer after a first step in a fabrication process;

determining first parameters for the feature location from the first optical metrology measurement, said determining step including comparing the measurement to theoretical optical results calculated from a first theoretical model of the wafer using a first set of theoretical parameters;

taking a second optical metrology measurement at the same feature location after a subsequent step in the fabrication process; and

determining second parameters for the feature location from the second optical metrology measurement, said determining step including comparing the measurement to theoretical optical results calculated from a second theoretical model of the wafer using a second set of theoretical parameters in combination with at least one of the previously determined first parameters used as a fixed parameter thereby reducing the number of fitting parameters needed to determine the second parameters.

37. (New) A method according to claim 36, wherein:

determining first parameters includes determining at least one of a critical dimension, profile, refractive index, extinction coefficient, and layer thickness at the feature location.

38. (New) A method according to claim 36, further comprising:

passing said first parameters to a process tool for modifying the subsequent step in the fabrication process.

39. (New) A method according to claim 36, wherein:  
determining the second parameters includes performing a three-dimensional characterization of the features being examined.
40. (New) A method according to claim 36, further comprising:  
illuminating a spot on the feature with a broadband light source.
41. (New) A method according to claim 40, further comprising:  
focusing light from the broadband light source to the spot on the microelectronic feature using at least one optical element selected from the group consisting of focusing lenses, focusing mirrors, and narrowing apertures.
42. (New) A method according to claim 40, further comprising:  
polarizing the light from the broadband light source using a polarizing element positioned between the broadband light source and the microelectronic feature.
43. (New) A method according to claim 40, wherein:  
illuminating a spot on the feature with a broadband light source includes light of multiple wavelengths.
44. (New) A method according to claim 36, wherein:  
taking a first optical metrology measurement includes using a spectrometer to measure characteristics of light returned from the feature location.
45. (New) A method according to claim 44, wherein:  
the characteristics being measured are selected from the group consisting of reflection intensity, polarization state, and angular distribution.